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FOREIGN TECHNOLOGY DIVISION



ACCELERATOR OF TECHNICAL PROGRESS

by

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ACCELERATOR OF TECHNICAL PROGRESS

By: O. Kremnev

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ACCELERATOR OF TECHNICAL PROGRESS

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Each great step of our domestic technology indicates a definite stage in the scientific revolution. The role of electrification, mechanization, and automation in modern technology is generally known. The appearance of effective gas turbine engines brought to life modern high-speed turboprop and jet aviation, possessing a previously unthinkable load-lifting capacity. The influence of cybernetics is seen in industrial control and in the planning, collecting, and processing of various types of information. An important role in improving the effectiveness of industrial construction and machine building has been played by the outstanding achievements in electric welding. Broad possibilities for technical progress lie in space technology and the future utilization of a controlled thermonuclear synthesis.

It is generally known that technical progress depends first of all upon the rise in the effectiveness of technical sciences. Furthermore, the discovery by natural scientists of new laws of nature is often impossible without a thorough and exact experiment, which again is based on achievements in the technical sciences and modern technology. At the same time, the effectiveness of the technical sciences, their "yield," is the sum of the activity of not only the scientific institutions themselves, but also of the

ministries (departments) and enterprises. As is shown by experience, only the combined forces of these organizations guarantee the derivation and broad utilization of great scientific results. Consequently, it is important to have their clear cooperation.

Of course, we should expect a considerable amount of work from technical institutions which will allow us substantially to improve or to create new machines, devices, and technological processes. Investigations should be conducted in an acceptable form for use by industry. And for this, in addition to progressive new ideas and scientific personnel, it is necessary to have a well equipped laboratory and experimental industrial base, properly organized financing, and certain moral and material stimuli. Otherwise, institutions are quite often forced to be satisfied with a small program, and then it is difficult to expect them to create a new technique.

Many scientific institutions, such as the Ye. O. Paton Institute of Electric Welding, the Cybernetics Institute at the Academy of Sciences of the Ukrainian SSR, the High-Temperature Institute of the Academy of Sciences USSR, TsAGI, and TsNIITMash, solve serious problems in the creation of new techniques and transmit their solutions to industry in the form of prepared samples or methods checked under experimental industrial conditions. As a rule, these are large institutions with experimental construction bureaus and experimental plants. Their collectives are distinguished by excellent qualifications and practical single-mindedness. They created their experimental bases by long and persistent labor.

Undoubtedly, other technical institutions should also devote more concern to equipment, but this process requires help. We state here not only that the new five year plan should provide a plan for the construction of first-line experimental and research bases. It is also advisable to make available for the institutions small plants and factories, which are not very profitable from the viewpoint of modern line production, but are adaptable for the

preparation and testing of prototype machinery or the experimental testing of new technological processes. For example, in Kiev there are more than twenty such small enterprises: mechanical and mechanical repair enterprises, several small factories of nonstandard equipment, electronic, ceramic, and gypsum items, and others. In production volume and nomenclature they are not of much use for their branches of industry, but in the role of experimental industries they could be of great use to our national economy.

An increase in work effectiveness at technical institutions would promote the formation of their own funds for development and stimulating material interest. At the present time such experiments are being made in many departments, which become completely self-supporting. However, it is hardly advisable for many institutions to be completely self-supporting. In our opinion, the financing of operation should be of a composite nature: search operations and operations connected with the development of science itself, financed from a budget; part of the applied research handled by ordinary economic means; and a part in fractions when the institute receives a fraction of the savings made by using the results of its achievements. Resources coming from such agreements allow scientific groups to form funds for development, material interests, and social and cultural measures.

The final purpose of any technical institution is to attain broad practical use of its achievements. For this reason, it should cooperate with enterprises and ministries in the introduction of its works, and it should participate in experimental and industrial tests to improve its leading models, to adopt series or mass production, and to refine new technical processes.

Unfortunately, we still have many defects in the practical introduction of scientific and technical achievements. Operations which require no considerable capital investments and can be performed for the specific industries financing them are, as a rule, employed without any special difficulties. Much more complex is the task involving research which requires great expenditures and

many enterprises, although it is precisely this that has the greatest effect and radically improves technology. Who should finance these institutions? At times individual groups venture to do this because they are conscientious, or because they themselves participate in the work or are required to by higher organizations. These enterprises do suffer small losses quite often for the first samples are always expensive and have less effect than subsequent, improved samples.

As an example, the financing and technical provisioning for the intensification of thermal-engineering processes in the synthetic and artificial fibre industry, including the creation of eleven new devices, was assigned to the Kiev group of chemical fiber enterprises. This equipment is needed by many enterprises. And they will obtain it, in even more highly perfected form, without having expended any resources for it. And the pioneer group is forced, in order to bring the job to an end, to overcome difficulties in financing and in conducting experimental operations. It is evident that it would be wiser to have a special fund in the main offices and ministries, created by deductions from enterprises for the purpose of financing research and experimental industrial operations in which many factories are interested.

Now let us have a few words about the organization of technical sciences. At the present they are dispersed among the institutes of the union and republic academies of science, branch institutes, higher educational institutions, design and planning establishments, and enterprises. This generally reflects the needs of modern science and industry. But some problems still exist. As early as the beginning of the sixties the union and republic academies had departments of technical sciences and corresponding institutes. Then most of the institutes were transferred to ministries, and the departments of technical sciences were liquidated. The virtual exclusion of the technical sciences from our academies can hardly promote the development of these sciences or increase their role in technical progress. Sciences require not only maximum specialization, but also maximum mutual exchange. In our opinion,

it would have been advisable to discuss the problem of creating an independent Academy of Technical Sciences USSR or, at least, a section of the Academy of Sciences USSR which would consist of several important departments of technical sciences. The same goes for the republic academies.

Modern industry becomes more and more complex; it requires constant daily aid from scientists. But there are few scientific workers with high qualifications in many factory labs and design and planning organizations. Right now scientists working at enterprises make wages comparable to their coworkers in institutes. Work at a plant is much harder, and this measure has not yet given the desired results. Nevertheless, as shown by the experience of many of our aviation and other design bureaus and test plants which have a considerable amount of scientific personnel, the direct inclusion of scientists into the sphere of industry is highly fruitful. The necessity has arisen to bring science closer to industry. For this purpose we have created separate academy and university labs at large enterprises or at united specialized institutions when it is advisable. In our opinion, this will promote an increase in the effectiveness of science and its role in technical progress.

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<p>This article discusses the relation of Scientific Research Institutes in the USSR and Ukrainian SSR with industrial and commercial enterprises. It reviews the progress and certain problems of introducing scientific and research achievements to industry. It discusses funding problems for certain research and advises closer contact between Science and Industry.</p>					